

## Surge tank for drill cuttings

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### Abstract of GB2393744

A surge tank (1) is provided between the process stages of screening of drill cuttings and thermal processing where the drill cuttings are cleaned of contaminated oil from drilling operations. This ensures a constant feed of drilling cuttings to the latter process stage. The surge tank (1), the shape of which is preferably conical with the greatest area at the lower section, is equipped with a kneading machine (7, 9) and a bottom-covering output device (3, 5). The output device has screws 3 positioned in complementary trays 5. The kneading machine has blades 7 mounted on a shaft 9 which is at right angles to the screws 3. The blades prevent the cuttings settling on the bottom of the surge tank.

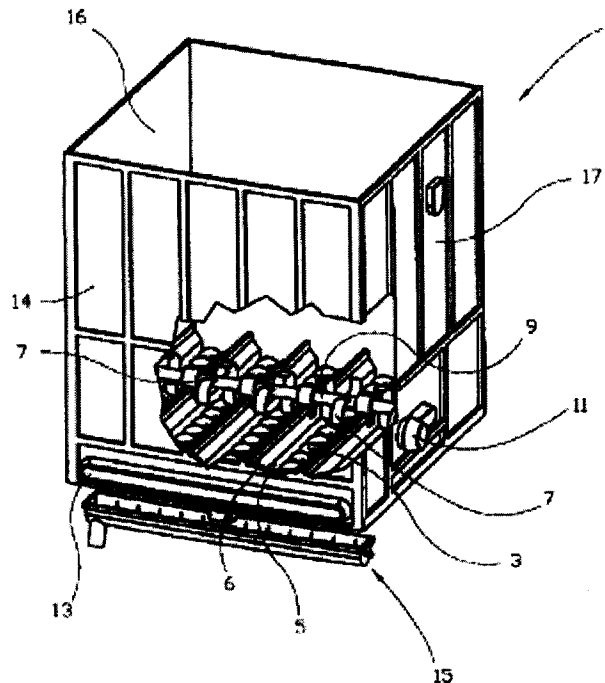


Fig. 1

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(56) Documents Cited:  
**GB 2339443 A** **GB 2112049 A**  
**WO 2002/044515 A1**

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(54) Abstract Title: **Surge tank for drill cuttings**

(57) A surge tank (1) is provided between the process stages of screening of drill cuttings and thermal processing where the drill cuttings are cleaned of contaminated oil from drilling operations. This ensures a constant feed of drilling cuttings to the latter process stage. The surge tank (1), the shape of which is preferably conical with the greatest area at the lower section, is equipped with a kneading machine (7, 9) and a bottom-covering output device (3, 5). The output device has screws 3 positioned in complementary trays 5. The kneading machine has blades 7 mounted on a shaft 9 which is at right angles to the screws 3. The blades prevent the cuttings settling on the bottom of the surge tank.

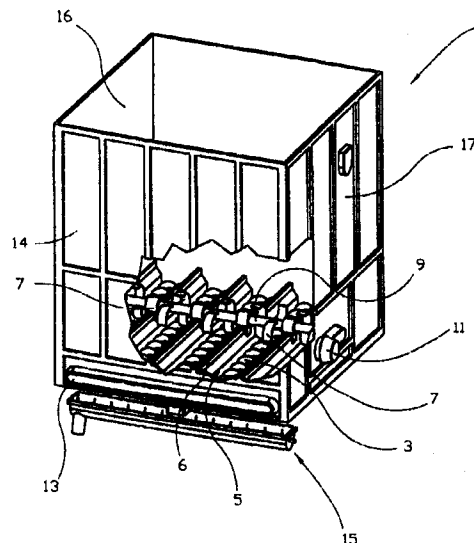


Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995 This print incorporates corrections made under Section 117(1) of the Patents Act 1977.

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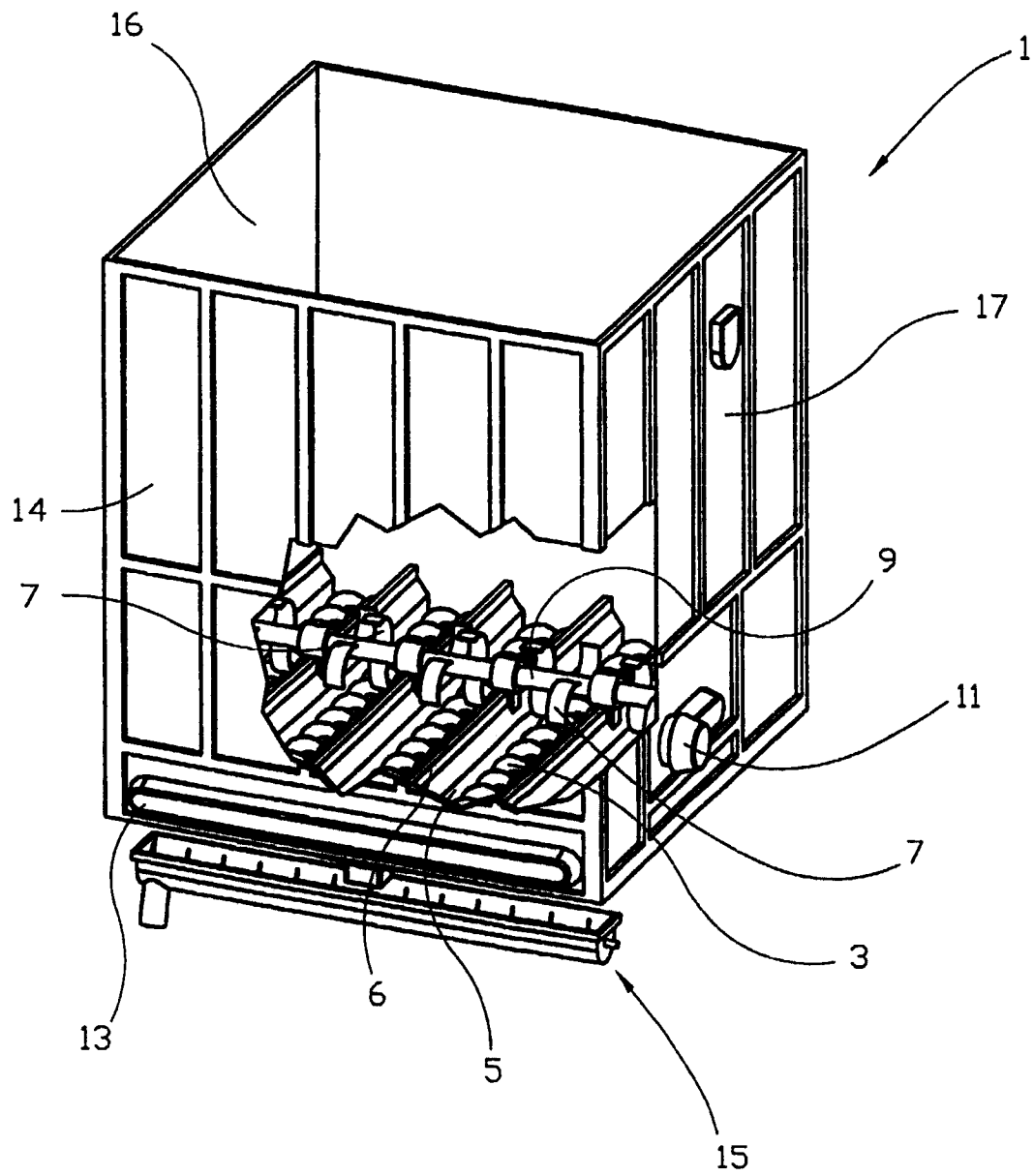


Fig. 1

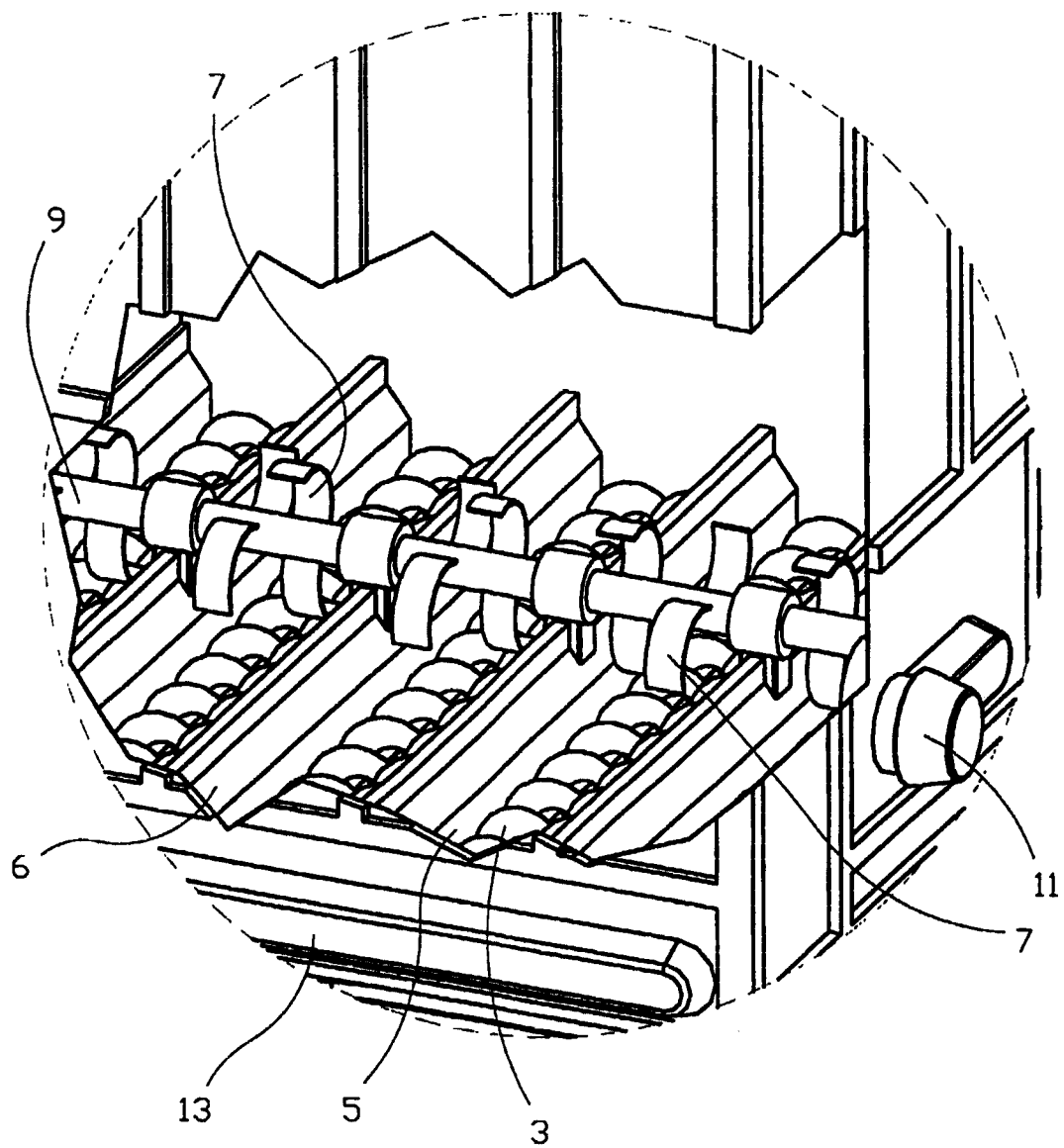


Fig. 2

## SURGE TANK

This invention regards a surge tank, preferably to be used for intermediate storage ("storing and forwarding") of drill cuttings on offshore and onshore installations. The surge  
5 drum, which has a slightly conical shape with the greatest area at the lower section, is equipped with an output device at the lower section and a kneading machine arranged just above the output device. The purpose of the kneading machine is to keep the mass sufficiently loose, so as to achieve a  
10 steady and controlled output of mass through an elongated slot in the output device in the continuation of the output device.

The object of the invention is to provide a device that in a stable manner functions as a surge drum for masses that are  
15 difficult to store and forward due to the fact that the mass "settles" and in consequence becomes difficult to convey out of the surge drum. The storage capacity of the surge drum, and the output from it, must be constant and capable of adjustment according to the capacity of the preceding and  
20 following process stages.

When drilling for oil, drill cuttings that are contaminated with oil must be cleaned in order to comply with environmental requirements from the authorities. Drill cuttings are cleaned by means of a technology that includes thermal processing. This process can treat up to 5 tons per hour, which at times is insufficient when seen in relation to the quantity of drill cuttings produced. As such, there is a requirement for intermediate storage of drill cuttings in one or more surge tanks with sufficient dimensions, both in terms of volume and output capacity to the following thermal treatment, to allow the highest possible degree of utilization of the thermal treatment process. Upon interruptions in the drilling or screening process (coarse cleaning process) or the subsequent thermal cleaning process, the buffer that is formed by the surge tank will result in less interaction between the drilling or screening process and the subsequent thermal cleaning process.

From other industries, tanks are known which are equipped with output devices. Tanks that are equipped with devices that maintain a certain movement in the stored mass are also known. In addition, tanks exhibiting varying areas at different sections through the construction are known, e.g. storage tanks exhibiting a conical shape.

It is not known for a surge tank to be used for intermediate storage of drill cuttings between the processes of screening (coarse cleaning) and thermal treatment of drill cuttings. The object of the invention is to provide a surge tank that will act as a stable buffer between the drilling process and the process of cleaning drill cuttings contaminated with oil.

The object is achieved in accordance with the invention by the characteristics stated in the description below and in the appended claims.

The present invention is constituted by a surge drum equipped  
5 with two or more feed screws, each of which is disposed in a complementary tray that forms the entire or part of the bottom of the surge tank. In order to prevent the mass from "settling" in or by the feed screws, at least one rotating blade is arranged just above the at least two feed screws.  
10 The at least one blade is attached to a rotating shaft, the centre line of which preferably runs at right angles to the centre line of the at least two feed screws, and attached to the surge tank in one or more places. The weight of the overlying masses is a contributing factor to the mass  
15 settling in the lower part of the tank. In order to reduce the pressure from the overlying masses, and thereby the risk of the mass settling, the tank is preferably shaped as a cone with the largest area at the lower section of the tank.

The following describes a non-limiting example of a preferred  
20 embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of a surge drum, where part of the tank wall has been cut away; and

Figure 2 is an enlarged view of the cut-through section of  
25 the tank in Figure 1.

In the drawings, reference number 1 denotes a surge tank equipped with feed screws 3 arranged in complementary trays 5 that are provided in the lower portion of the surge tank 1

and form the bottom of the surge tank 1. Immediately above the output device of the surge tank 1, which consists of feed screws 3 with complementary trays 5, there are blades 7 attached to a rotating shaft 9 that is connected to drive means 11. The mass is led into the surge tank 1 from the top, where the horizontal area of the surge tank 1 is smaller than the area of the surge tank 1 at the lower section, where the blades 7 and the output device are disposed. When the feed screws 3 are rotated by means of a driving apparatus that is known *per se* (not shown), the mass will be conveyed out of the surge tank 1 through an elongated slot 13 in the front section 14 of the surge tank 1, from where a conveyor 15 will bring the mass on to the next process stage (not shown) in a manner that is known *per se*. In order to adjust the output volume from the surge tank 1 per unit of time to the next process stage, the feed screws 3 are connected to a variable speed drive (not shown). The shaft 9 is supported in the vertical walls 16, 17 of the surge tank 1 at right angles to the shaft 9 and also on several of the tray edges 6.

The surge tank 1 may be constructed in different sizes, with a typical capacity of between 10 and 200 tons, depending on the requirements and technical limitations of the installation. The surge tank 1 will help make the interdependence between the drilling operation or screening (coarse cleaning) of the drill cuttings and the subsequent thermal cleaning process less sensitive to interruptions in one of said processes.



## C l a i m s

1. A device for ensuring a constant feed of drill cuttings to the process stage of cleaning drill cuttings of contaminated oil from drilling operations,  
5 c h a r a c t e r i s e d i n that a surge tank (1) is arranged preferably between the process stages of screening of drill cuttings and thermal processing of drill cuttings.
2. A device in accordance with Claim 1,  
10 c h a r a c t e r i s e d i n that in the position of use, the surge tank (1) has a conical shape with the greatest area at the lower section.
3. A device in accordance with Claim 1 or 2,  
15 c h a r a c t e r i s e d i n that the surge tank (1) is equipped with two or more feed screws (3) that cover essentially the entire lower section of the surge tank (1).
4. A device in accordance with Claim 3,  
20 c h a r a c t e r i s e d i n that the feed screws (3) are placed, one by one or more, in complementary trays (5).
5. A device in accordance with one or more of the preceding claims, c h a r a c t e r i s e d i n that the surge tank (1) is equipped with two or more blades (7) rigidly  
25 mounted to at least one rotating shaft (9) disposed over the feed screws (3).



INVESTOR IN PEOPLE

**Application No:** GB 0301547.6  
**Claims searched:** 1-5

**Examiner:** R L Williams  
**Date of search:** 28 January 2004

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1	GB 2,339,443 A      Apollo Services UK Ltd (note surge tank 300 fig 8)
X	1	GB 2,112,049 A      Mobil Oil Corporation (note lines 119-127 page 2)
X	1	WO 02/44515 A1      Apollo Services UK Ltd (note surge tank 300 fig 8)

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>w</sup>

E1F

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

E21B

The following online and other databases have been used in the preparation of this search report:

EPODOC, WPI, JAPIO